

OPTICA ACTA

an international journal of modern optics and laser physics

Volume 32

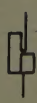


Europhysics Journal

**founded under the auspices of the
International Commission for Optics**



**published by
Taylor & Francis
London and Philadelphia**



**in collaboration with
The Institute of Physics
Bristol and London**

OPTICA ACTA

An international journal of modern optics and laser physics

Board of Editors

- | | |
|--|--|
| R. Loudon
(<i>Honorary Editor</i>) | Department of Physics, University of Essex, Wivenhoe Park,
Colchester CO4 3SQ, U.K. |
| S. J. Bennett | Division of Mechanical and Optical Metrology, National
Physical Laboratory, Teddington TW11 0LW, U.K. |
| M. Bertolotti | Dipartimento di Energetica Sezione Fisica, Università di
Roma, 00161 Roma, Italy. |
| O. S. Heavens | Department of Physics, University of York, Heslington, York
YO1 5DD, U.K. |
| P. L. Knight | Optics Section, Blackett Laboratory, Imperial College,
London SW7 2BZ, U.K. |
| Bridget Marx | Coherent (U.K.) Ltd, Cambridge Science Park, Milton Road,
Cambridge CB4 4BH, U.K. |
| R. A. Sprague | Xerox Corporation, Palo Alto Research Center, 3333 Coyote
Hill Road, Palo Alto, California 94304, U.S.A. |
| Shun-ichi Tanaka | Department of Applied Physics, University of Tokyo,
Bunkyo-ku, Tokyo 113, Japan. |
| K. J. Teegarden | College of Engineering and Applied Science, University of
Rochester, Rochester, New York 14627, U.S.A. |
| C. Vêret | ONERA, 29 Avenue de la Division Leclerc, Châtillon-sous-
Bagneux (Hauts de Seine), 92320 Châtillon, France. |
| R. Ulrich | Arbeitsbereich Optik und Meßtechnik, Technische Universität
Hamburg-Harburg, 2100 Hamburg 90, F.R. Germany. |

International Advisory Editorial Board

- | | |
|---|---|
| H. H. Hopkins
(<i>Chairman</i>) | Department of Physics, University of Reading, Whiteknights
Park, Reading RG6 2AF, U.K. |
| L. R. Baker
(<i>Secretary</i>) | Sira Ltd, South Hill, Chislehurst, Kent BR7 5EH, U.K. |

Australia: R. McPhedran (1987); *Czechoslovakia:* J. Peřina (1985); *France:* A. Maréchal (1985); *F. R. Germany:* A. F. Fercher (1987), H. Walther (1988); *India:* G. S. Agarwal (1987); *Italy:* G. Toraldo di Francia (1985); *Japan:* K. Murata (1985); *New Zealand:* D. F. Walls (1985); *Norway:* J. J. Stamnes (1985); *P. R. China:* Gan Fuxi (1988); *Poland:* S. Kielich (1985); *Sweden:* E. Ingelstam (1985), S. Walles (1985); *Taiwan:* Yajun Li (1988); *U.S.A.:* P. W. Smith (1988), B. J. Thompson (1985).

Editorial Office

- | | |
|---|---|
| C. G. Daish
(<i>Staff Editor</i>) | Taylor & Francis, 4 John Street, London WC1N 2ET, U. K.
Telephone: 01-405 2237/9. Telex: 858540. |
|---|---|

CONTENTS OF VOLUME 32

No. 1 January 1985

	PAGE
Book reviews	1
Coherent pulse propagation on a Q-branch transition in atomic iodine vapour <i>Gan Xu, T. A. King and J. J. Bannister</i>	7
Quasi ray-optical approach to longitudinal periodicities of free and bounded wavefields <i>J. Ojeda-Castañeda and E. E. Sicre</i>	17
Influence of surface roughness on radiation from parabolic mirror collimators with cylindrical symmetry in the Fraunhofer region <i>I. Ohlidal</i>	27
A three-dimensional analogue of the Hottel string construction for radiation transfer. <i>G. H. Derrick</i>	39
Coherent population trapping. Two unequal phase fluctuating laser fields <i>B. J. Dalton, R. McDuff and P. L. Knight</i>	61
Frequency cross-correlation of intensity fluctuations in multiple scattering . . . <i>B. J. Uscinski and C. Macaskill</i>	71
Quadratic filtering of two-dimensional signals by use of serial and parallel optical processors <i>N. S. Subotic, H. K. Liu and B. E. A. Saleh</i>	91
Orthoscopic telecentric lenses <i>I. D. Nikolov</i>	107

No. 2 February 1985

Special Issue

OPTICS '84

Foreword	121
Interferometer for d.c. level removal in optical Fourier transforms <i>A. P. Lang</i>	123
Automatic fringe analysis in holographic interferometry <i>A. E. Ennos, D. W. Robinson and D. C. Williams</i>	135
Making a multiscale random rough surface. <i>E. Berry</i>	147
A survey of the accuracies of some methods for the determination of the optical constants of thin films <i>L. Ward</i>	155

	PAGE
Best-fit spheres and conics as an aid in the manufacture and testing of diamond-turned aspheric optics	169
<i>J. D. Briers</i>	
A novel dual-field i.r. scanner	179
<i>E. S. Cameron</i>	
The effect on optical performance of grain boundaries in germanium	191
<i>R. M. Mackay and F. J. Busselle</i>	
Early performance data from the ROSAT X.u.v. wide field camera	197
<i>M. A. Barstow, R. Willingale, B. J. Kent and A. Wells</i>	
Speckle statistics and depth discrimination in the confocal scanning optical microscope.	209
<i>E. R. Mendez</i>	
Optical component limitations to development of optical fibre sensors	223
<i>B. E. Jones and R. C. Spooncer</i>	
Monomode fibre optic interferometric techniques in flow velocity measurement	233
<i>P. Akhvan Leilabady, J. D. C. Jones and D. A. Jackson</i>	
A compact all-optical fibre Doppler-difference laser velocimeter	241
<i>R. K. Y. Chan, J. D. C. Jones and D. A. Jackson</i>	
Application of pyroelectric detector elements for high reflectance determination	247
<i>R. J. Batt and D. Calcutt</i>	
Effects of variations in refractive index on the interferometric measurement of microtopography in glasses	251
<i>K. W. Raine and A. Franks</i>	
No. 3 March 1985	
A new method of sample optimization.	255
<i>S. P. Luttrell</i>	
A depolarization criterion in Mueller matrices	259
<i>J. J. Gill and E. Bernabeu</i>	
Book reviews	263
Analysis of mode coupling in planar optical waveguides.	265
<i>E. Popov and L. Mashev</i>	
On the vibronic laser theory.	281
<i>E. Sigmund and P. Schwendimann</i>	
Diffraction by an arbitrary number of individual non-overlapping apertures randomly distributed over a finite screen. Monochromatic illumination	287
<i>R. Barakat</i>	
The statistical properties of partially polarized light.	295
<i>R. Barakat</i>	
Optimization of imperfect diffuse reflectors.	313
<i>G. H. Derrick and I. M. Bassett</i>	
Image subtraction by the spatial filtration technique.	329
<i>A. A. Lapides and M. E. Zhabotinski</i>	

	PAGE
Complex amplitude distribution transmitted by a refracting surface of revolution. Application to the calculation of the spherical aberration	337
<i>E. Larrea, C. Gómez-Reino and J. E. Alvarelos</i>	
Binomial states of the quantized radiation field.	345
<i>D. Stoler, B. E. A. Saleh and M. C. Teich</i>	
The photon echo generated by atoms with non-zero nuclear spin.	357
<i>I. V. Evseev, P. V. Nesterov and V. A. Reshetov</i>	

No. 4 April 1985

Meetings calendar	371
Improving initial phase estimates for phase retrieval algorithms	377
<i>M. C. Won, D. Mnyama and R. H. T. Bates</i>	
Transient energy transfer during hologram formation in photorefractive crystals	397
<i>J. M. Heaton and L. Solymar</i>	
Interferometry based on the Lau effect: A quasi-ray description	409
<i>N. Bolognini, J. Ojeda-Castañeda and E. E. Sicre</i>	
Edge imaging with mutually incoherent point sources	423
<i>Y. Imai and Y. Ohtsuka</i>	
Radiation functionals for non-stationary optical radiation and their determination	433
<i>R. Gáse and M. Schubert</i>	
Caustics and diffraction from a line source	441
<i>G. Dangelmayr and F. J. Wright</i>	
Frequency-shifted local oscillator produced by a rotating radial grating for a heterodyne detector.	463
<i>I. Péczeli, P. Richter and F. Engard</i>	
Role of double-exposure holography on the shrinkage effect in silver halide gelatin	469
<i>C. Hernandez, C. Bainier and D. Courjon</i>	
Determination of optical constants of thin films with non-uniform thickness from the fringe pattern of the transmittance spectra	479
<i>M. I. Török</i>	
Periodic fluctuations in a Fabry-Perot cavity in resonance with a reservoir of two-level atoms.	485
<i>R. K. Colegrave and A. Vahabpour-Roudsari</i>	

No. 5 May 1985

Editorial	499
Super-poissonian effects in a quantum model for a free electron laser.	501
<i>L. Huerta and M. Orszag</i>	
Book reviews	507

	PAGE
Special Issue	
Progress in Optical Physics	
Foreword	509
Photonic logic. The first step towards the optical computer. <i>W. R. MacGillivray, S. D. Smith, H. A. MacKenzie and F. A. P. Tooley</i>	511
Optical logic—in the light of computer technology. <i>R. W. Keyes</i>	525
Speckle-pattern velocimetry applied to the measurement of zeta potential . . . <i>M. Christopher, J. Eacott, F. Lawson, R. G. Turner and G. J. Troup</i>	537
Simple model for a passive optical power limiter. <i>J. A. Hermann</i>	541
Optical edge enhancement applied to scenes with natural vegetation backgrounds <i>M. S. Brown</i>	549
Some aspects of simultaneous evaporation techniques <i>D. N. W. Chinnery</i>	557
Diffraction patterns of generalized curvilinear diffraction gratings. Comparisons between theory and experiment. <i>R. A. Lee, D. F. Lynch and I. J. Wilson</i>	573
Phase constraints for lossy symmetric structures. <i>R. C. McPhedran and L. C. Botten</i>	595
Modern optical design assessment and spectacle lenses <i>D. A. Atchison</i>	607
No. 6 June 1985	
The determination of mode coupling coefficients <i>E. Popov and L. Mashev</i>	635
Book reviews	639
A new approach to two-dimensional phase retrieval <i>N. Nakajima and T. Asakura</i>	647
Determination of the time dependence of periodic optical signals by correlation spectroscopy. Application to the investigation of fast density fluctuations in free jet mixing <i>G. Schweiger</i>	659
Calculation and measurement of the diffraction efficiency of a dilute developed silver halide holographic plate. <i>Zhang Chunping, Zhang Guanyin, Cong Hui, Zhao Lin, Yan Shuqin and Bi Xianlin</i>	679
The use of bivariate polynomial factorization algorithms in two-dimensional phase problems <i>H. M. Berenyi, H. V. Deighton and M. A. Fiddy</i>	689
Prior knowledge and object reconstruction using the best linear estimate technique. <i>S. P. Luttrell</i>	703

	PAGE
The effect of a strongly inhomogeneous medium on the propagation of light beams under multiple scattering conditions	717
<i>E. Battistelli, P. Bruscaiglioni, A. Ismaelli and G. Zaccanti</i>	
Optical differentiation of displacement patterns obtained by double-exposure moiré-holographic method	731
<i>K. Patorski and L. Salbut</i>	
Realization of Fourier images without using a lens by sampling the optical object	
<i>A. Kołodziejczyk</i>	

No. 7 July 1985

Book reviews	747
A non-markovian model of photodetection of cavity radiation	749
<i>S. K. Srinivasan and R. Vasudevan</i>	
Equalization of the complex reflection coefficients for the parallel and perpendicular polarizations of an absorbing substrate coated by a transparent thin film	767
<i>R. M. A. Azzam and B. E. Perilloux</i>	
An exact ray representation of bound modes in a step-profile planar slab waveguide	779
<i>S. V. Chung, R. A. Lee and L. N. Binh</i>	
Isoplanicity and lifetime of stellar speckle interferograms.	793
<i>J. Ebersberger and G. Weigelt</i>	
NOE: A hybrid method for multiplexed holography for display purposes. . . .	803
<i>J. Fleuret, S. Pantelis and J. M. Caussignac</i>	
White light fringes and dispersion in two-beam interferometry.	811
<i>D. A. Palmer</i>	
Annular pupil arrays. Application to confocal scanning	815
<i>Z. S. Hegedus</i>	
Some considerations on the statistical error analysis in holographic interferometry with application to an optimized interferometer	827
<i>W. Osten</i>	
Thin film optics in the soft X-ray region. S-polarization.	839
<i>O. Litzman and I. Šebelová</i>	

No. 8 August 1985

Book reviews	845
Multimode resonators, insensitive against thermal lensing	847
<i>K. P. Driedger, B. Lu and H. Weber</i>	
Realization of first order optical systems using thin lenses	855
<i>E. C. G. Sudarshan, N. Mukunda and R. Simon</i>	
Determining spectral parameters of waveguide devices by investigation of mode polarization distribution	873
<i>L. Grochowski and J. W. Y. Lit</i>	

	PAGE
Phase conjugation of a plane electromagnetic wave at an interface	881
<i>M. Nieto-Vesperinas</i>	
Grazing diffraction by volume phase gratings.	891
<i>M. V. Vasnetsov, M. S. Soskin and V. B. Taranenko</i>	
Application of the generalized boson operators to a boson-fermion system. . .	901
<i>A.-S. F. Obada and M. M. A. Ahmed</i>	
Light scattering by large particles. I. A new theoretical description in the eikonal picture	907
<i>J. M. Perrin and P. Chiappetta</i>	
Tolerances for focus stability in zoom lenses	923
<i>S. G. Shiue</i>	
Collection of light with the aid of reflectors. An algebraic solution.	937
<i>G. H. Derrick and I. M. Bassett</i>	

Nos. 9/10 September/October 1985

Special Issue Twenty-Five Years of the Laser

Twenty-five years of the laser. The European contribution to its development	961
<i>M. Bertolotti</i>	
Modification of relaxation dynamics of a quantum system by intense laser fields†	981
<i>G. S. Agarwal</i>	
Rate-equation and Bloch-equation theories of radiation pressure on two-level atoms†	995
<i>A. Al-Hilfy and R. Loudon</i>	
Laser heterodyning†	1015
<i>M. C. Teich</i>	
Photon antibunching and squeezing. Two non-trivial effects of the nonlinear interaction of laser light with matter†	1023
<i>S. Kielich, M. Kozierowski and R. Tanaś</i>	
Quantum statistics of scattering between relativistic electrons and interfering laser fields in the zero-gain approximation†.	1039
<i>V. Peřinová, J. Peřina and A. Lukš</i>	
Far-infrared, waveguide and distributed-feedback gas lasers†.	1055
<i>F. K. Kneubühl</i>	
Lasing of vapours of complex organic compounds†	1071
<i>N. A. Borisevich</i>	
Free-electron lasers in Europe†	1089
<i>J. M. Ortega</i>	
Rydberg atoms. A testing ground for quantum electrodynamics†.	1105
<i>P. Filipovicz, P. Meystre, G. Rempe and H. Walther</i>	
Modes in wall-reflection planar halo lasers†	1125
<i>Z. Gy. Horváth and S. Varró</i>	

	PAGE
Large signal behaviour of optical pulse generation in Q-switched GaAlAs/GaAs injection lasers†	1145
<i>W. Harth</i>	
Dynamic-single-mode lasers†	1157
<i>Y. Suematsu, S. Arai and F. Koyama</i>	
Advantages and limits of light pulse compression inside and outside the laser cavity†	1175
<i>B. Wilhelmi, W. Rudolph, E. Döpel and W. Dietel</i>	
Laser photoionization spectroscopy of single atoms and molecules†	1191
<i>V. S. Letokhov</i>	
Laser-induced effects in Te-Ge multilayer thin films†	1211
<i>C. Ortiz, C. N. Afonso and E. Acosta</i>	
Experimental study of the laser speckle phase in the image field†	1223
<i>H. Kadono, N. Takai and T. Asakura</i>	
Opto-electronic bistable devices for image processing†	1235
<i>V. I. Vlad</i>	
Intensity-induced rotation of the polarization ellipse in low-birefringence, single-mode optical fibres†	1251
<i>B. Crosignani and P. Di Porto</i>	
Quantum theory of subharmonic lasers. Stability analysis.	1259
<i>L. Sczaniecki and E. Szczepaniak</i>	
Use of the F_2^-: LiF colour-centre laser in intracavity laser spectroscopy	1273
<i>V. P. Kochanov, V. I. Serdyukov and L. N. Sinitsa</i>	
High efficiency pulse compression by Raman induced cavity dumping.	1281
<i>F. de Rougemont, R. Frey and F. Pradère</i>	
Holographic DFB dye lasers	1291
<i>A. N. Rubinov and T. Sh. Efendiev</i>	

† Invited papers

No. 11 November 1985

Photon-antibunching by use of a photoelectron-event-triggered optical shutter	1303
<i>J. G. Walker and E. Jakeman</i>	
Diffraction by a tilted aperture. Coherent and partially coherent cases	1309
<i>H. J. Rabal, N. Bolognini and E. E. Sicre</i>	
Book reviews	1313
Représentation de l'effet d'une réflexion et d'une réfraction sur la lumière polarisée par le formalisme des quaternions.	1317
<i>P. Pellat-Finet et Y. Souche</i>	
Optical differentiation of distorted gratings using Talbot and double diffraction interferometry: Further considerations.	1323
<i>K. Patorski and L. Salbut</i>	

	PAGE
The analogy between nonlinear light scattering from particles and from a relativistic electron beam	1333
<i>M. Bertolotti and C. Sibilis</i>	
Angular characteristics of a laser light interference modulator	1339
<i>G. D. Zartov, R. A. Peyeva and Kr. P. Panajotov</i>	
Depth of field measurements relevant to single photon detection using image-intensified microscopy	1349
<i>A. J. Walton, R. H. Templer and Geo. T. Reynolds</i>	
Aberration-free imaging of large fields with thin pencils.	1361
<i>G. Schulz</i>	
Evaluation of two-dimensional quantizers for Fourier transform binary holograms	1373
<i>V. V. Krishna and P. S. Naidu</i>	
Generalized raytracing and applications	1385
<i>D. Schütze</i>	
Polychromatic MTF-based criteria for evaluating photographic image quality	1397
<i>S. Bosch, I. Juvells and J. R. de F. Moneo</i>	
Beam-splitters for the division-of-amplitude photopolarimeter	1407
<i>R. M. A. Azzam</i>	
Vector effects in holographic optical elements.	1413
<i>R. R. A. Syms</i>	
Speckle: an electromagnetic theory for shallow rough surfaces	1427
<i>J. P. Rossi and D. Maystre</i>	

No. 12 December 1985

Editorial	1445
Meetings calendar	1447
Book reviews	1449

Festschrift

W. H. Steel

Foreword	1453
Contouring aspheric surfaces using two-wavelength phase-shifting interferometry	1455
<i>K. Creath, Y.-Y. Cheng and J. C. Wyant</i>	
An interferometer with a zone plate as beam-splitter	1465
<i>A. W. Lohmann</i>	
Spectrométrie interférentielle par modulation sélective et detection de polluants gazeux	1471
<i>A. Maréchal</i>	
Zone-plate radial-shear interferometers A study of possible configurations . .	1475
<i>R. N. Smartt and P. Hariharan</i>	

	PAGE
Completeness and modal expansion methods in diffraction theory	1479
<i>L. C. Botten and R. C. McPhedran</i>	
Fan-in and fan-out with optical interconnections	1489
<i>J. W. Goodman</i>	
Optical processing of lattice images	1497
<i>I. J. Wilson</i>	
<hr/>	
Modified Robertson projection-operator method for coherently driven two-level atoms in a resonant cavity.	1509
<i>J. Seke</i>	
Correlated K-distributed clutter models	1515
<i>C. J. Oliver</i>	
Evolution of photon statistics in multiphoton absorption of strong radiation . .	1549
<i>P. Chmela</i>	
Non-uniform transient gratings induced by laser pulses in nonlinear media. . .	1567
<i>V. S. Idiatulin</i>	
Limits to concentration by passive means	1577
<i>I. M. Bassett</i>	
Index of authors (with titles)	1593
Index of book reviews	1601
List of contents	iii

